

Applicant: Takao Tsuruoka
Application No.: 10/646,637

REMARKS/ARGUMENTS

The present application, after amendment, contains claims 1-32. Claims 1, 4, 5, 27 and 28 have been amended. Claims 31 and 32 have been newly added. Claims 8-10, 14, 20-22 and 26 have been withdrawn from consideration as being directed to a non-elected invention.

Making reference to the Office Action Summary, it is noted that the this Office Action is a non-final action setting a three (3) month response date which expires August 21, 2009. It is submitted that this Amendment, together with a Petition for One-Month Extension of Time and the requisite fee, have been timely filed.

Allowable Subject Matter

Applicant thanks the Examiner for indicating that claims 6, 11-13, 18 and 23-25 will be allowed upon amendment to incorporate all of the limitations of their base claim and any intervening claims. However, it is submitted that the need for amendment of these claims has been obviated by amendment of their base claim which is now submitted to be allowable over the art.

Drawings and Claim For Foreign Priority

It is noted that the drawings filed August 22, 2003, have been accepted by the Examiner and that the claim for foreign priority and receipt of the certified copies of the priority documents have been acknowledged.

Finality of Office Action

It is noted that the finality of the Final Office Action dated December 24, 2008 has been withdrawn pursuant to 37 C.F.R. §1.114 and that Applicant's submission filed March 18, 2009, has been entered.

Claim Rejections - 35 U.S.C. §102

Claims 1-4, 15, 16 and 27 have been rejected under 35 U.S.C. §102(b) as being anticipated by Massimo Mancuso et al. (U.S. Patent No. 6,256,414) (hereinafter, "Mancuso et al."). This rejection is respectfully traversed.

The correction unit 15 shown in Fig. 1 of the present application corrects the amount of noise which is estimated by performing a calculation, for example. More specifically, in a first step, the noise estimator initially estimates an approximate amount of noise and, in a second step, the estimated amount of noise is corrected based on the shooting condition obtained by the shooting condition estimating unit 16 forming part of the correction unit, thereby increasing the precision of the estimated amount of noise.

These "two steps of noise estimation" are described in detail in the Substitute Specification filed on August 22, 2003, together with a Preliminary Amendment in the United States Patent and Trademark Office. It should be noted that, as described in the Substitute Specification at page 19, paragraph [0098], the amount of noise is estimated by the noise estimator employing the noise model shown at Equation 5 at page 18, paragraph [0090], and a correction coefficient $d(s)$ which is obtained from shooting conditions estimating unit 16 of Fig. 1 to correct the estimated amount of noise, this calculation being shown as Equation 6 in paragraph [0098].

The first step processing and the second step processing set forth above are closely correlated to one another. For example, assuming the amount of noise estimated in the first step is "10" then in the second step the estimated amount "10" is corrected to "14" depending on the shooting condition, thereby finally reducing noise from the signal by the corrected amount of noise, i.e., "14."

The two-step procedure provides a highly precise estimation of the amount of noise. Note, page 23, paragraph [00114] which sets forth the precision obtained by the two-step operation described above.

In contrast, Mancuso et al., Fig. 2 and at column 4, lines 32-36 describe a process wherein element 245 estimates a noise level using information from elements 235 and 240, which may be said to correlate to the Applicant's first step. Nevertheless, Mancuso et al. fail to teach or even remotely suggest correcting the estimating result obtained by estimating element 245. Thus, Mancuso et al. clearly fail to teach the second step described above.

The noise reduction unit 250 shown in Fig. 2 and described in column 4, lines 38-42 of Mancuso et al., reduces noise contained in the image based on an amount of noise estimated by the estimation unit 245 and based on the spatial characteristics of the image. The color-tone correction unit 255 of Mancuso et al., described at column 4, lines 55-60, corrects a specific color such as the blue color of the skin and the sky or the green color of a plant, depending on the type of illumination, without altering the other colors. It is noted that the Examiner considers that no altering the other colors equates to not adding further noise.

Considering a specific example similar to that described above regarding the Applicant's two-step process, let it be assumed that "the amount of noise estimated by estimation unit 245" is "10," then the noise contained in the image is reduced based on the value "10" and the spatial characteristics of the image. Nevertheless,

Mancuso et al. **directly** reduces the noise itself contained in the image and does not perform a correction upon the "estimated amount of noise itself" as recited in claim 1, as amended.

It is thus submitted that Mancuso et al. neither disclose nor remotely suggest "estimating an amount of noise in two steps" as recited in amended claim 1.

The noise correction unit in the present application is configured such that noise reducing unit 19, shown in Fig. 1, performs noise reduction with respect to each color signal from a color signal separating unit 15, **based on the amount of noise corrected by correction unit 18** which is described in the Substitute Specification at page 10, paragraph [0062].

In contrast, the color tone correction unit 255 of Mancuso et al. corrects a color tone based on the type of illumination and corrects one or more color categories "without altering the other colors of the image." See column 4, lines 54-57 of Mancuso et al. Thus, it can thus be seen that Mancuso et al. form color-tone correction processing employing unit 255 **independent** of the amount of noise estimated by estimation unit 245.

Claim 1 has been amended to permit the noise type to "noise related to random noise" to clarify the noise type. Mancuso et al. fails to teach or remotely suggest random noise and thus clearly fails to teach or even remotely suggest estimating random noise as a first step and then correcting the estimated amount of noise based on a shooting condition as a second step, before removing noise from the image.

The Final Office Action dated December 24, 2008, at Item 5 on page 4, in response to Applicant's arguments states:

"...element 255 correct alterations...of one or more color categories without altering the other colors of the image...improves the quality of representation [in an image]."

However, as described in the Substitute Specification, page 1, paragraph [0010], "random noise is generated in the image pickup elements and analog circuits, and has the characteristics that are close to white noise characteristics." It is thus apparent that image color alteration is not related to the image pickup elements and the analog circuits have **no** relation to random noise and accordingly it is submitted that unit 250 shown in Fig. 2 of Mancuso et al. does **not** "reduce the noise related to random noise in said signal" as is specifically performed by the noise reducing unit in claim 1, which reduces "the noise related to random noise in said signal."

The Examiner further reasserted in the Final Office Action dated December 24, 2008, at Item 5 on page 4, Response to Argument, "In the case of Mancuso et al., element 255 is clearly subsequent and directly attached to the noise reduction unit 250; thus, there is no question that the noise being reduced is based on the amount of noise corrected by the correction unit."

It is submitted that the signal sent from element 250 to element 255 in Mancuso et al. is **not** a corrected amount of noise, but the image itself subjected to noise reduction processing by element 250. Thus, element 255 merely corrects the color tone based on an **image** sent from noise reduction unit 250, but not based on an "estimated amount of noise which is corrected" as is recited in the method claim 1.

As regards the phrase "based on at least one of control....related to said signal" added to claim 1, the Examiner, in item 4 of the Response to Arguments in the Office Action mailed May 21, 2009, stated "There is no language in Claim 1

elaborating on what the actual shooting condition estimate is or how the estimator functions.” Responsive thereto, the Examiner’s attention is directed to the text in the English specification at paragraphs [0056]-[0057] in the substitute specification submitted to the U.S. Patent Office with the Preliminary Amendment filed August 22, 2003, which fully supports the limitation “based on at least one of control....related to said signal,” and clarifies what the actual shooting condition estimator is and how it functions. More specifically, “control information related to a shooting unit,” is control information related to the shooting unit, such as focus, exposure and zoom position information provided to the shooting conditions estimating unit 16 to estimate a shooting condition. The phrase “information related to said signal” is fully supported by the text in the Substitute specification at paragraphs [0068]-[0077]. More specifically, the shooting condition estimate is further based, for example, on average brightness of the signal.

In view of the above arguments and the amendments to claim 1, it is submitted that the noise reducing unit recited in amended claim 1 is clearly novel and patentable over Mancuso et al. in the sense of both §§ 102 and 103.

In addition, Mancuso et al. neither disclose nor suggest a noise reducing unit as is set forth in amended claim 1 of the present application.

Claims 2-4, 15 and 16 all depend from claim 1 and carry all of its limitations and are deemed to patentably distinguish over Mancuso et al. for the same reasons as set forth above regarding claim 1.

Method claim 27 has been amended to recite substantially the same limitations incorporated in apparatus claim 1 and it is submitted that claim 27 patentably distinguishes over Mancuso et al. for the same reasons set forth above regarding claim 1.

Claim 4 has further been amended to depend from claim 1 and to clarify the shooting condition estimator which provides the function of estimating the shooting condition using control information related to a shooting unit or to information related to the signal when an image is acquired. See the amendments to claim 4.

New claim 31 which depends from claim 4 is likewise submitted to patentably distinguish over Mancuso et al. for the same reasons as set forth above regarding claims 1 and 4, from which claim 31 depends. In addition, Mancuso et al. neither teach nor remotely suggest estimating a shooting condition using **brightness information** obtained from a regional estimating unit (note the support found for this limitation as set forth above in the arguments urging patentability of claim 1) and focus information of a shooting unit and it is submitted that claim 31 patentably distinguishes over Mancuso et al. for this added reason. Figure 4 of the present application discloses an exemplary technique related to the regional estimating unit and Figure 5 discloses an exemplary technique of the shooting condition estimator for estimating a shooting scheme using information shown in Figure 4, as well as focus information which fully supports claim 31.

Claim 5, which has been amended, likewise depends from claim 1 and it is submitted that claim 5 patentably distinguishes over Mancuso et al. for the same reasons set forth above regarding claim 1. Amended claim 5 recites the shooting condition estimator for estimating a shooting condition for an overall signal when an image based on the signal is acquired, based on at least one of focus information, exposure information obtained by the shooting unit, zoom position information, eye sensing information and strobe light emission information. These features are neither taught nor remotely suggested by Mancuso et al. as well as any of the other cited references. The amendments to claim 5 regarding the shooting unit are fully supported in the specification. See page 11, paragraph [0068]. All of the text

supporting the amendment to claim 5 is found at page 14, paragraph [0078] and paragraph [0079] bridging pages 14 and 15. Focus and exposure information as well as zoom, eye sensing and strobe light emission, found at page 22, paragraph [00112] further supports the amendments to claim 5.

Claims 28 and 29 have been rejected under 35 U.S.C. §102(c) as anticipated by Edward B. Gindele et al. (U.S. Patent No. 7,054,501) (hereinafter, "Gindele et al."). This rejection is respectfully traversed.

Element 130 of Gindele et al. receives a residual digital image and calculates a set of local residual histograms from the pixel data of the residual digital image. The residual digital image is derived from subjecting the original image to filter processing by element 120, which applies a spatial filter to the digital image 201. It can thus be seen that the residual digital image is based on data that is **clearly related** to a signal configuring the original image and is data that is clearly **related to a signal level**. In other words, the data provided for element 130 is clearly not information which **is not relevant** to signal level.

Element 140 of Gindele et al., as described in column 4, lines 49-51 and column 7, lines 40-45, derives a standard deviation of noise from an updated histogram, which updated histogram is created based on **signal data** of an image outputted from element 130. See the text at column 4, lines 45-51. Thus, the data provided by element 140 is clearly information which is provided that **is relevant** to a signal level.

The "average pixel value" set forth in the left-hand column of TABLE (2) appearing between lines 24 and 35 in column 8 of Gindele et al. is an average value of pixels configuring the image and this is specifically **information that is related to a signal level**. Values shown in TABLE (2) are altered depending on the "average pixel value," and therefore cannot be said to be information which is not

relevant to a signal level. Thus, information provided which is not relevant to the signal level in the present application refers, for example, **a constant that is not relevant to a signal level (L)** as per the coefficients A, B, C and D set forth in the Equations (4) and (5) respectively set forth in paragraphs [0087] and [0090], which coefficients **do not vary**, i.e., are **constant**.

It is thus submitted that Gindele et al. neither disclose nor remotely suggest a parameter calculator at a noise estimator as recited in claim 28 of the present application.

New claim 32 depends from claim 28 and recites that the non-relevant information comprises coefficients used by the noise estimator and which do not vary as a function of signal level.

Amended claim 28 calculates the coefficients A, B, C and D employed in the Equations (4) and (5) and uses as a variable a parameter related to information which is not relevant to signal level, such as a temperature T of the image pickup element, a gain G for the signal, and a shutter speed S employed during a picture taking, and estimates a target amount of noise N using the Equations (4) and (5) specified by the calculated coefficients A, B, C and D. More particularly, the image pickup system set forth in amended claim 8 calculates the coefficients employed in Equations (4) and (5) for estimating the amount of noise N, as a dynamic function that uses, as variables, a parameter related to information which is not relevant to the signal level.

In view of the foregoing, it is submitted that Gindele et al. neither disclose nor remotely suggest "calculating a coefficient itself of the function equation for estimating the amount of noise N, as a function that uses, as a variable, a parameter related to information which is not relevant to signal level," as recited in amended claim 28.

Claims 29-32 depend from claim 28 and carry all of its limitations and hence are deemed to patentably distinguish over Gindele et al. for the same reasons set forth above regarding claim 28.

Claim Rejections - 35 U.S.C. §103

Claims 7 and 19 have been rejected under 35 U.S.C. §103(a) as unpatentable over Mancuso et al. in view of Official Notice (MPEP §2144.03). This rejection is respectfully traversed.

Claims 7 and 19 both depend from claim 1 and carry all of its limitations and hence are deemed to patentably distinguish over Mancuso et al. taken alone for the same reasons recited above regarding claim 1. It is submitted that the Official Notice relied upon by the Examiner is not relevant to the subject matter of amended claim 1 and it is therefore submitted that claims 7 and 19 patentably distinguish over Mancuso et al. in view of Official Notice. It is submitted that “back lighting or excessive front lighting” will affect a histogram of the **frequency distribution** of an image whereas night view shooting would affect the entire image and it would not be obvious to Mancuso et al. to take night view shooting into consideration when creating a histogram of the frequency distribution of the image.

In addition, Applicant notes that the Examiner has attempted to take Official Notice of a fact that determining that a shooting condition is of night view shooting is well known and expected in the art, in rejecting claims 7 and 19, based on combining Mancuso et al. and Official Notice. This attempt is not in compliance with the provisions set forth in MPEP §2144.03 “Reliance on Common Knowledge in the Art or “Well Known” Prior Art [R-6] - 2100 Patentability.” The attempted Official Notice fails to explicitly state the factual findings predicated on sound technical and scientific reasoning to support taking the Official Notice and fails to

provide the explicit basis on which Official Notice is based so that the Applicant is able to challenge the assertion in the next reply after the Office action. MPEP §2144.03(C) Withdrawal of the rejection is respectfully requested.

Claim 30 has been rejected under 35 U.S.C. §103(a) as unpatentable over Gindele et al. in view of Official Notice (MPEP §2144.03). This rejection is respectfully traversed.

Claim 30 depends from claim 28 and carries all of its limitations and is submitted to patentably distinguish over Gindele et al. taken alone. The Official Notice relied upon by the Examiner not relevant to the amendments to claim 28 and it is submitted that claim 30 patentably distinguishes over Mancuso et al. in view of Official Notice. The unique source identification tag in the text at column 12, lines 12-24 is directed to characteristics of a specific film or a specific camera whereas the temperature of an image pickup device, signal gain and shutter speed during shooting are not **characteristics** of a camera or film but are conditions which are present at the time of shooting so that even assuming for the sake of argument that the Examiner's Official Notice is combinable with Gindele et al., it would only be for the purpose of taking into account the effect that a specific film or a specific camera has on a scanned image, which is clearly not a teaching of utilizing the temperature of an image pickup device, signal gain and shutter speed during shooting for calculating parameters for use by a noise estimator.

In addition, Applicant notes that the Examiner has attempted to take Official Notice of a fact that utilizing the temperature of an image pickup device, signal gain and shutter speed during shooting for calculating parameters for use by a noise estimator is well known and expected in the art, in rejecting claim 30, based on combining Gindele et al. and Official Notice. This attempt is not in compliance with

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the provisions set forth in MPEP §2144.03 "Reliance on Common Knowledge in the Art or "Well Known" Prior Art [R-6] - 2100 Patentability." The attempted Official Notice fails to explicitly state the factual findings predicated on sound technical and scientific reasoning to support taking the Official Notice and fails to provide the explicit basis on which Official Notice is based so that the Applicant is able to challenge the assertion in the next reply after the Office action. MPEP §2144.03(C) Withdrawal of the rejection is respectfully requested.

In view of the foregoing, it is submitted that claims 1-5, 7, 15-17, 19, 27-30 and new claims 31 and 32 patentably distinguish over the cited prior art and reconsideration of allowance of these claims are earnestly solicited.

It is noted that claims 6, 11-13, 18 and 23-25 will be allowed if rewritten in independent form to include limitations of their base claim and any intervening claims. It is submitted that amendment of their base claim has obviated the need for amendment of claim 6, 11-13, 18 and 23-25.

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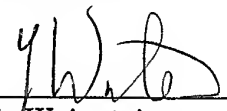
Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephone interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing amendment and remarks, Applicants respectfully submit that the present application, including claims 1-6, 7, 11-13, 15-19, 23-25 and 27-32, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

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Enclosures